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A review on the philosophy, ontology and epistemology of the Grounded Theory
Methodology to facilitate Business Informatics research as an inductive process

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Title: Business Informatics research as a grounded theorizing process: ontological and epistemological considerations

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Summary: Disruptive innovation and the increased speed of digital transformation not only challenge business, industry, and society. Also scholars, especially in the field of Business Informatics and Information Systems, have to break new ground. This paper investigates the Grounded Theory Methodology and presents it as a 'technique' to develop scholarly innovation (i.e., new artifacts, concepts, categories, theories, etc.). The research problem of this paper can be outlined as follows: on the one hand, Heinrich (2005, 2012) concludes that the discipline of Business Informatics, which is composed of the partial discipline of Business Informatics, *a theoretical and engineering-related research approach*, and the partial discipline of Information Systems, *a formal scientific related research approach*, lacks in the research methodological education of researchers. On the other hand, the discipline can rely on existing knowledge. For example, Wolfswinkel et al. (2013) present a five-stage grounded-theory method in the field of information systems research for reviewing the literature. In both cases, the questions about the GTM's philosophy, ontology, and epistemology are left open. Based on a Grounded Theory Methodology managed literature review, this paper investigates these issues. In doing so, it presents advances in the course of the Grounded Theory Methodology at the philosophical, ontological, and epistemological level and augments and enriches Wolfswinkel et al. (2013) five-stage grounded-theory method. It supports scholars in the building of theory inductively – based on quantitative and qualitative empirical data. This literature review provides knowledge about the ongoing discussion about how the Grounded Theory Methodology can be better mastered and applied – especially for scholars within the disciplines of Business Informatics¹.

Track: Research Methodology

Word count: 6.395

¹ As entitled in the German-speaking area: Business Informatics and System Engineering (BISE).

1 Introduction

A specter is haunting² scholars – the specter of disruptive innovation in an increased digital transformation in societal systems. This specter, caused by innovators and entrepreneurs, increases the speed of dynamism and creatively destruct known practices (Schumpeter, 2005) and societal behavior. To respond to disruptive innovation but also to respect the state of the art in research and science at the same time (i.e., scientific rigidity, and scientific relevance), scholars must break new grounds.

This paper presents the Grounded Theory Methodology (GTM) a 'technique' to develop and build innovations, i.e. new theories, frameworks, models, etc. from empirical data in the field of Business Informatics and Information Systems Research as well as its related fields of research: i.e., Business Administration, Social Sciences, Applied Computer Science and Applied Mathematics (Heinrich et al., 2011).

The research motivation for this paper has two roots: on the one hand, in an article on the history of business informatics (*note: the German name comparable to the Anglo-American discipline Information Systems Research; a brother discipline* (Heinrich, 2012)), Heinrich (2005) concludes that the discipline, which is composed of business informatics (theoretical and engineering related research approach; incl. the design and development of models or concepts (i.e., Heinrich (2005, 2012)) and information systems (formal scientific related research approach (i.e., Heinrich (2012))), lacks in the research methodological education of researchers. Offers were and are rare – and even more rarely were and are accepted. On the other hand, Wolfswinkel et al. (2013) present a five-stage process for a Grounded Theory-based literature review in the field of Information Systems Research, based on the elements: define – search – select – analyze – present (c.f. figure 1). Nevertheless, Wolfswinkel et al. (2013) leave the questions about the GTM's philosophy, ontology, and epistemology open.

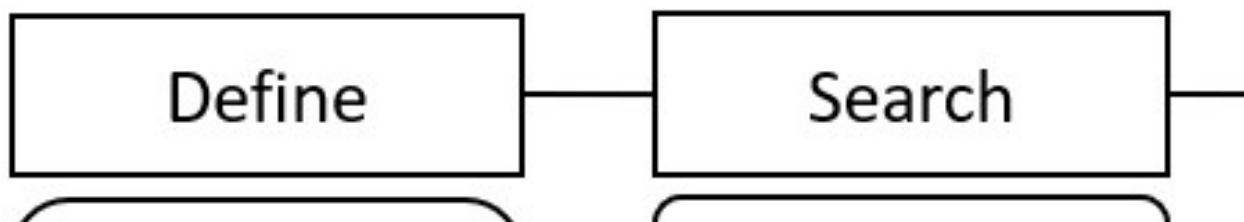


Fig. 1: Wolfswinkel's et al. (2013) five-stage grounded-theory method for reviewing the literature in an area (to be used iteratively)

The purpose of this paper is to investigate the philosophy, ontology, and epistemology of the Grounded Theory Methodology (GTM). The paper's objective is to provide a philosophical base for researchers in the field of business informatics, especially in Information Systems research, to perform research inductively and to generate theories from empirical data. The paper enables the reader to develop distinct capabilities to "read" empirically data and identify/derive disruptive ideas and innovation (i.e. new theories, concepts, categories, etc.). Additionally, the paper augments Wolfswinkel's et al. (2013) five-stage grounded-theory method and support novice researcher and scholars in the field of Informations Systems research to better master and understand inductive theorizing as well as to more dedicatedly apply the Grounded Theory Methodology.

The paper is organized as follows in four sections. Section 1 introduces the research problem and presents the research motivation. The research design is presented in section 2. Section 3 presents the literature review and its findings. Section 4 presents a brief conclusion and highlights the characteristics of scholars to successfully perform Grounded Theory Methodology based research.

² In reference to the introduction of Karl Marx's book: »Das Kapital«

2 Research methodology and research design

The applied methodology for this paper is the literature review. Hart (2003), for example, defines a literature review as the “selection of available documents [...] on topic, which contains information, ideas, data and evidence written from a particular standpoint to fulfill certain aims or express certain views on the nature of the topic and how it is to be investigated, and the effective evaluation of these documents in relation to the research being proposed”.

Table 1. Cooper's (1985, 1988) taxonomy of literature reviews

Characteristics and definition based on Cooper (1985, 1988)		The approach applied in this paper
Focus	Concerns the material that is of central interest to the reviewer, e.g. on research outcomes, research methods, theories, and practices or applications.	Research methods and theories on Grounded Theory Methodology. The cultural manifestation of the material is presented below
Goals	Goals concern what the author hopes the review will accomplish. The most obvious goal for a review is to integrate and synthesize past literature that is believed to relate to the same issue.	Integrate and augment the existing knowledge on the Grounded Theory Methodology in the disciplines of Business Informatics and Information Systems Engineering and Wolfswinkel's et al. (2013) review model with philosophical, ontological, and epistemological knowledge.
Perspective	Neutral or dispassionate representation and espousal or advocacy of a position.	Neutral representation; with no or as little personal interpretation and evaluation
Coverage	The extent to which reviewers find and include relevant works ..., how reviewers search the literature ..., how they decide the suitability and quality of material ...	The coverage is presented in detail below
Organization	How the paper is organized, e.g. historically, conceptually, methodologically.	Conceptually, based on the applied coding process
Audience	Reviews can be written for groups of specialized researchers, general researchers, practitioners, policymakers, or the general public.	Novice researchers and senior researchers within the field of Business Informatics / Information Systems

As presented in table 1, a literature review should accomplish six characteristics that are: focus, goals, perspective, coverage, organization, and audience. Additionally, the applied approach within this is described in this table 1. The research design of the literature review at hand follows the structure proposed by Lamnek (1995), which is also visualized in Figure 2.

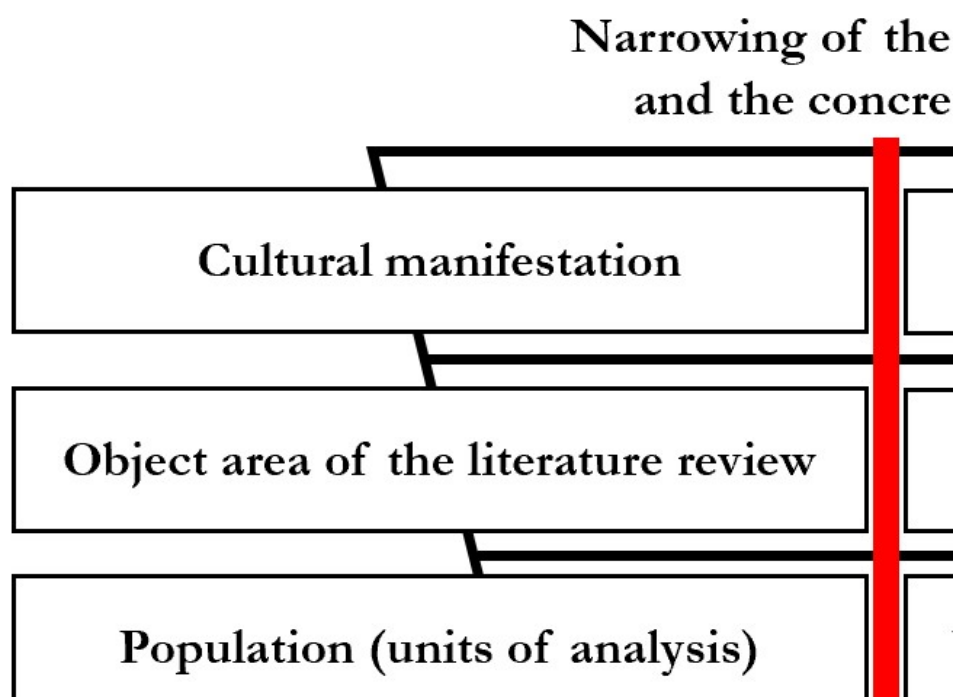


Fig 2. Schematic visualization of the approach of the literature review

Due to the huge amount of literature on Grounded Theory Methodology (GTM), or in the words of Smith (2015) that »there is not a lack of books about grounded theory«, a pragmatic literature research approach to **narrow the object area** (c.f. Fig 2., the number I) has been applied. The SAGE Handbook of Grounded Theory (2010) and The SAGE Handbook of Current Developments in Grounded Theory (2019) has been selected as the main sources of knowledge for the systematic literature review. Additionally, articles from The SAGE Handbook of Social Research Methods (2008), the European Journal on Information Systems (2013; Vol 22, Issue 1), the SAGE Journal Organizational Research Methods (2015; Vol 18, Issue 4), and section one from Grounded Theory – A Practical Guide (2015; second edition) augment the object area (the coverage, in the words of Cooper (1985, 1988)). The reason for the selection of these object areas is the international acceptance (i.e. leading researchers within the field have published articles in these samples), the international community, and its general contribution to the standard of the discipline.

Table 2: Selection process of the sample size

Cultural manifestation & object area of the literature review →	
	I
	Total
The SAGE Handbook of Grounded Theory	27

As depicted in table 2, 41 articles (out of 123) went through a rigorous literature skimming and scanning process (**narrowing of the concrete object**; c.f. Fig 1, number II). Following Hart (2003), the articles' titles, abstracts, introductions, and conclusions have been reviewed and cross-checked with their appropriateness of set research motivation. 36 articles passed this skimming and scanning process and have been selected for the literature review at hand.

The selected 36 articles are (co-) authored by 45 authors. Barney Glaser, *a pioneer in Grounded Theory Methodology*, and Judith Holten are listed three times each as (co-) authors; Birks, Charmaz, Morse, Levina, and Kelle are listed two times each. 29 researchers are listed once as (co-) authors.

The literature review methodology applied (c.f. the **operationalization of the theoretic-hypothetic preliminary considerations**; c.f. Fig 1, number III) for the analysis and evaluation of the selected articles is the Grounded Theory Methodology (GMT). The selected articles have been open-coded/micro-coded (Belgrave & Seide, 2019): the coding of as important rated passages (quotes), incl. text, figures, tables, etc. Open coding is, as Wolfswinkel et al. (2013) highlight, about the close reading of a set of single studies and the early abstracting and categorizing of the hidden aspects of the research topic under exploration (e.g. findings, theoretical and methodological insights). The objective of open coding is to produce useable and useful abstractions (Belgrave & Seide, 2019). The applied coding paradigms are line-by-line and word-by-word coding (i.e. Kelle (2010), Belgrave & Seide (2019)). As next, axial coding has been applied. Axial coding is about an intense analysis of the open codes and their further development as well as their alignment to categories. Lastly, selective coding has been applied. Selective coding is about the identification and development of relations between the categories and is used to integrate and refine the categories.

Table 3: Coding process: operationalization of the theoretic-hypothetic preliminary considerations

Selective codes (Categories)	Axial codes (Concepts)
GTM at a glance	Definition
	Types of GT
Protagonists	Philosophy
	Glaser GT
	Strauss GT
	Charmaz GT
	Critics Glaser GT
	Coding

As depicted in table 3, 2.658 quotes have been clustered among 148 open codes. A quote was able to get clustered to more than one open code (1:n clustering). As next, the open codes have been clustered among 19 axial codes (1:1 clustering). Finally, the axial codes have been clustered among 6 selective codes (1:1 clustering). The review and coding were a simultaneous and iterative process: after reading a »fistful« of

articles, the articles have been coded. In doing so, the open codes as well as the ideas for axial codes raised simultaneously – captured in memos. The review and coding started at the beginning of July and ended in October 2021. The theoretical saturation was reached at end of September 2021: no new or essential codes, concepts, or categories emerged at this time. The coding and clustering were accompanied using the computer-assisted tool MAXQDA2020. This tool is conceptualized especially to perform qualitative research, i.e. the coding of data and the clustering of quotes to codes as well as its structured analysis and evaluation. The clustering took part before but also partly during the analysis and evaluation of selected literature as well as during the writing of the scholarly article at hand.

3 Literature Review

In the following sections, the results of the applied coding and clustering process are presented. As depicted in table 3, these are »GTM at a glance«, »Protagonists«, »GTM applied«, »Category«, and »Theory/theory building«, organized in three sections about GTM's philosophical background, ontology, and epistemology.

3.1 The essence of the GTM world

This section is organized into two sub-sections. As depicted in table 3, these are the categories »Grounded Theory Methodology (GTM) at a glance« and »Protagonists«.

3.1.1 Grounded Theory Methodology (GTM) at a glance

The category of »Grounded Theory Methodology (GTM) at a glance« consists of two concepts (Definition, Types of GT), 14 open codes, and 321 quotes. Although, as Corley (2015) highlights, GTM is ontologically and epistemologically flexible as well as provides room for adaption and creativity (Corley, 2015), GTM is rigorous (Birks et al., 2013) and robust (Belgrave & Seide, 2019) methodology.

As explored, GTM is an inductive (Thornberg & Dunne, 2019) research methodology (Stern, 2010) and has been used with different approaches, with different »tools« and for different purposes (Walsh et al., 2015). GTM is used in many scientific disciplines, such as in Business Informatics and Information Systems and its related disciplines (Kelle, 2019), and is widely accepted across all philosophical foundations (Corley, 2015). GTM accommodates different philosophical perspectives (Birks et al., 2013) and is, as Walsh et al. (2015) cite Glaser (2005) a »research paradigm for discovery«. The objective of GTM is to build theory from empiricism (Walsh et al., 2015), a theory that is empirically grounded in data (e.g. Walsh et al. (2015), Thornberg & Dunne (2019)) and renders the processes and procedures of qualitative investigation: visible, comprehensible, replicable (Bryant & Charmaz, 2010). GTM provides the answer to the questions »why« and »what« (is the story here?) by the investigation into the empirical field and its data sources. In GTM, all is data (Walsh et al., 2015). Thus, the researcher can make use of a variety of types of data sources and media (Holton, 2010). It does not require full coverage, since it is an iterative procedure. The GTM goes beyond description: it is about the conceptualization of theory (Walsh et al., 2015). The codes and categories emerge directly from data (Kelle, 2010). The research products of a GTM research are, for example, new core categories (Hood, 2010), models (Kearney, 2010), reports, articles, books, etc. that are contributions to ongoing substantive and theoretical conversations from different methodological perspectives (Lempert, 2010). But also, the output of a GT study is, as Holton (2010) highlights, the generation of probability statements about the relationships between categories.

3.1.2 Protagonists

The category »Protagonists« is based upon two concepts, 13 open codes, and 321 quotes. As Thornberg & Dunne (2019) argues, the GTM roots in the American pragmatist tradition can be traced back to Charles S. Peirce, Willam James, John Dewey, and George H. Mead (Kelle, 2019). Today, GTM, as Belgrave & Seide

(2019) argues, compound positivism, objectivism, and constructivism (Charmaz, 2008). Identified philosophical streams are, for example, (*post*) positivism, pragmatism, constructivism, postmodernism, interpretivism, interactionism, objectivism, realists, neo-empiricist, semiotics, interpretive situationist, and methodologist.

As explored in these units of analysis, GTM is the cooperative development of Barney Glaser and Anselm Strauss and was first presented in 1967 with their book »The Discovery of Grounded Theory: Strategies for Qualitative Research«. This book is the basis for more recent development, even within the approaches and variants of these two protagonists (Birks et al., 2013). While Glaser, for example, retained the idiosyncratic idea of GTM, Strauss paved the way for the development of a constructivist GTM. In this sense, Charmaz could be identified as the further protagonist of this stream (e.g. Thornberg & Dunne (2019), Priya (2019)).

Table 4: Comparison of the main protagonists' GTM approaches

	Glaser GTM	Strauss GTM
Influences	Columbia University, incl. training in quantitative methods and middle-range theories (Bryant & Charmaz, 2010)	Chicago School of Sociology (Bryant & Charmaz, 2010)
Books	The Discovery of Grounded Theory: Strategies for Qualitative Research (1967)	
	Awareness of Dying (1965), Time for Dying (1968), Status Passage (1971)	
	Theoretical Sensitivity (1978)	Qualitative Analysis for Social Scientists (1987)
In common	Theoretical sampling, constant comparison, focus on the development of the theory (Hood, 2010)	
Dispute	Criticises constructivist GT: cannot be the aim of GT to invent concepts, but to discover them in the material	Rejects post-modernist approaches to the formation of concepts (Hildenbrand, 2010)
Data analysis	18 theoretical codes (Inaba & Kakai, 2019); 18 coding families, the six C's, concept-indicator model (Belgrave & Seide, 2019); now: a total of 41 coding families (Kelle, 2019)	Axial coding, paradigm, and condition/consequence matrix (Inaba & Kakai, 2019); a general paradigm model shall support the analysis (Kelle, 2019)
Influences	Relationship between hypothesis and theory (Belgrave & Seide, 2019)	Causal conditions (Belgrave & Seide, 2019)
Axial coding	After the GT theorist has advanced tentative categories (Charmaz, 2008)	Facilitates the development of concepts and categories (Charmaz, 2008)
Tools & techniques	Theoretical sensitivity: theoretical codes, theoretical coding, and coding families to describe a process (Kelle, 2010)	Paradigm model, a straight-forwarded model of human interaction and interaction rooted in pragmatist social theory (Kelle, 2010); utilization of a specified theoretical framework

Table 4 presents a comparison of the »general features« of the main protagonists in GTM. Glaser relates to positivism and objectivism whereas Strauss, a descendant of the Chicago School of Sociology, relates to pragmatism. Nevertheless, as Belgrave & Seide (2019) highlight, it is difficult to identify Strauss's philosophical stream. Strauss also relates to objectivism and post-positivism as well as paved the way to constructivism (e.g. Charmaz).

As highlighted in Kelle (2019), the most important difference between Glaser's approach and Strauss' approach is »that Strauss suggests the utilization of a specific theoretical framework based on pragmatist theory of action, whereas, with the Glaserian approach coding and category, the building has to be conducted based on a broad theoretical background knowledge«.

3.2 Ontology – the doctrine of being

This section is organized into two sub-sections. As depicted in table 3, these are the categories »Grounded Theory Methodology (GTM) applied« and »Category«.

3.2.1 Grounded Theory Methodology (GTM) applied

The category »Grounded Theory Methodology (GTM) applied« is made up of three concepts, 21 open codes, and 886 quotes. The concepts are Coding, Data, and Tools & techniques. As explored in the selected sample size, in GT »all is data« - and the categories emerge out of these data: quantitative data (i.e., Corley (2015); Walsh et al. (2015), *when appropriate and helpful*), numeric data/numbers (Smith, 2015), and qualitative data (Corley, 2015), i.e. words, images, etc. Stern (2010), for example, goes beyond: »... everything I see, hear, smell, and feel about the target, as well as what I already know from my studies and my life experience, are data«.

The data collection in GT follows a spiral of cycles of data collection, coding, analysis, writing, design, theoretical categorization, and data collection (Hood (2010) cites Glaser & Strauss (1967)). However, to build meaning and theories out of data, as, for example, Walsh et al. (2015), Morse (2010), and Charmaz (2008) argue, data need to have a conceptual guide: explicit guidelines for theorizing from data (rigorous). Sampling strategies, as Morse & Clark (2019) argue, must facilitate the development of abstract, generalizable mid-range theory. Four main sampling strategies could be identified: convenience sampling, purposeful sampling, theoretical sampling, and theoretical group interviews (Morse, 2010). Further sampling strategies are statistical sampling (Hood, 2010), population sampling (Covan, 2010), quantitative sampling, qualitative sampling (Morse & Clark, 2019), contingent non-probability sampling, inductive non-probability sampling, and inductive sampling (Hood, 2010). A key to sampling is early memoing (Holton, 2010). As Morse (2010) argues, the data collection conceptualization must be rigorous.

Once the data are collected, the data need to be analyzed and evaluated. As highlighted in Holton (2010), »coding is the core process in classic grounded theory methodology«. Centre to this coding, as identified in this category, are (1) coding tools, (2) kinds of codes, (3) coding methods, (4) coding process, and (5) coding requirements.

Within »coding tools« mainly the codes »coding paradigm« and »coding family« are captured. The coding paradigm, as (Kelle, 2019) highlights, is invented by Strauss and should be used to structure data and to clarify the relations between categories. It comes into play during axial coding. Glaser, as Hildenbrand (2010) argues, is critical of the coding paradigm (as well as the conditional matrix). Glaser advocates, as Kelle (2010) highlights, coding family (comprising causes, contexts, contingencies, consequences, covariances, and conditions; theoretical coding; with the 'strategy family' and the 'means-goal family' as part of theoretical sensitivity). According to Kelle (2010), the coding paradigm and coding family fulfill the same functions: »it represents a group of abstract theoretical terms which are used to develop categories from the data and to find relations between them«. Further coding tools are, for example, the codebook (for documentation of emergent and changing ideas), the six C's (causes, contexts, contingencies, consequences, covariances, and conditions, combined with the strategy family and the means-goal family (Urquhart, 2019)), structuration theory and theory of complementarities (Birks et al., 2013). »Kinds of codes« summarizes the identified codes and coding techniques that are, for example, (1) techniques: observation-by-observation coding, Line-by-line coding, Word-for-word coding, Interview-by-interview coding, Incident-by-incident coding (e.g. Hildenbrand (2010), Holton (2010), Kelle (2010)) and (2) codes: in vivo codes, modest codes (Belgrave & Seide, 2019), conceptual codes, topic-oriented codes (Holton, 2010), focused codes, initial codes (Belgrave & Seide, 2019). »Coding methods« captures the approaches of Glaser and Strauss. While Glaser favors substantive coding with two subtypes of open coding and selective coding and theoretical coding (categorizing of data with the help of previous knowledge (Kelle, 2019)), Strauss advocates open-, axial- and selective coding as means for theoretical sensitivity. As highlighted by Inaba & Kakai (2019), the Glaserian approach (e.g., 18 theoretical codes (relationships between constructs or categories (Urquhart, 2019)) and the Straussian approach (e.g., axial coding, paradigm, and condition/consequences matrix) were developed to facilitate data analysis by encouraging the researcher to examine the data from multiple perspectives. An incident, highlighted by Covan (2010), can be coded for several categories.

The »coding process«, starts without a predefined category (Kelle, 2019): starting with inductive data and subjecting them to scrutiny (Strübing, 2010). To keep theoretical sensitivity, as Holton (2010) highlights, the

researchers continuously ask questions such as: »What is this data a study of?«, »What category does this incident indicate«, »What is actually happening in the data?«, »What is the main concern being faced by the participants?«, and »What accounts for the continual resolving of this concern?« (Holton (2010) cites Glaser (1998)).

The »requirements of coding« are, as identified, that researchers do their coding: it constantly stimulates conceptual ideas (Holton, 2010) and enables them to continuously refine the concepts and categories (Wolfswinkel et al., 2013). Tools and techniques within GT are, for example, situational analysis/situational maps, condition matrix, and constant comparison. The situational analysis is, as Belgrave & Seide (2019) highlights, an approach of Clarke that goes beyond GTM by shifting the focus from human action to collective action: moving sociopolitical discursive context to the center (Kearney, 2010). Clarke & Friesen (2010) differs between situational maps, social worlds/arena maps, and positional maps. The comparative method, as Charmaz (2008) highlights, is an invention of Glaser and consists of a set of strategies for the development of theoretical categories (e.g. comparison of data with data, data with code, code with code, etc.). In doing so, as Charmaz (2008) highlights, the researcher moves up levels of abstraction. Visualization, especially diagramming is an integral part of GT works (Charmaz, 2008). They create, for example, a visual display and represent linkages more precisely and concisely (Lempert, 2010). The condition matrix is proposed by Strauss and acts as a coding tool to distinguish and link levels of conditions and consequences (Charmaz, 2008). It consists of the concepts of a conditional path, trajectory, social world, and arena (Hildenbrand, 2010). The cognitive model is a collective term for tools and techniques that could not be assigned to the above. It captures tools and techniques useful for GT research, such as triangulation (Flick, 2019), scientific observations (Kelle, 2019), quadri-hermeneutics (Kearney, 2010), surveys (Glaser, 2010), and GT interviews (e.g. Morse (2010), Stern (2010)), and the Socratic method (Covan, 2010). Computer assistance is about the application of computer-assisted coding software programs (Holton, 2010) and computer-assisted qualitative data analysis technology (CAQDA) (Belgrave & Seide, 2019).

3.2.2 Category

Within the category »Category«, three concepts emerged. This category is made up of 37 open codes and 369 quotes. As explored, the notion category (or classes or types), as Kelle (2010, 2019) highlights, can refer to any noun that the researcher found relevant to their research area. Categories, as highlighted by Dey (2010), express a clear and complete conceptualization of phenomena in terms of common features. However, they lack clear boundaries, are fuzzy, and are embedded into cognitive models.

The underlying process to develop categories is constant comparison (Dey, 2010), the design and development of memos and theoretical notes that act as conceptual connections between (Holton, 2010) (connect by categorizing (Dey, 2010)). The development of a category is an ongoing process of data collection and analysis (Kelle, 2019) and starts from the initial open coding of data (Holton, 2010): categories emerge through coding, conceptual memoing, and theoretical sampling. »Emerging«, in this sense, is understood as the demand to transform every idea into a category. The aim is to identify a »core category« (Walsh et al., 2015) – the transformation of the idea(s) into category/ies: letting categories emerge, and not forcing preconceived categories, as Kelle (2010) argues. Coding is a key analytical procedure (Dey, 2010). Codes generate initially substantive and later theoretical categories (Holton, 2010). As highlighted by Lempert (2010), it is foundational to spell out the connections between codes and codes, codes and categories, and categories and categories for the presentation of an integrated whole. »Once categories have been developed, clustered, and expanded, the analyst needs to sort them« (Stern, 2010).

Categories have, as Dey (2010), highlights, a dual role in GT. They can be analytic and sensitizing: to conceptualize the key analytic features of phenomena but also to communicate a meaningful picture of the phenomena. Four or five categories are sufficient for a GT study. A variety of types of categories have been identified. These are, for example, heuristic categories (Kelle, 2019), empirically contentful categories, theoretical categories (incl. implicit and explicit), formal categorizes, logic categories (Kelle, 2010), demographic categories (Hood, 2010), substantive categories (Holton, 2010), sensitizing categories, and

analytic categories (Dey, 2010). Category building, as highlighted by Wolfswinkel et al. (2013), is finalized when no new concepts, properties, and/or relationships (Holton, 2010) in the categories emerge – or in the words of Dey (2010): stop when the ideas run out. The researcher also reaches the point of theoretical saturation, a point that ensures the replication and validation of data as well as validity and reliability (Morse, 2010).

3.3 Epistemology – the process of cognition

This section captures the category »Theory/theory building«. It consists of four concepts, 32 open codes, and 714 quotes. As explored, there is an ongoing discussion about GT's epistemology (induction, deduction, abduction, and retroduction). GTM emerged as a meta-theory of inductive research (Walsh et al., 2015) – thus the overall movement of a GT is inductive and qualitative (Hood, 2010). As Thornberg & Dunne (2019), GTM begins with the empirical world and builds an inductive understanding. Inductive logic emphasizes simultaneously data collection and analysis to construct middle-range theories (Strübing, 2010). As Glaser highlights (1978; in Johnson & Walsh (2010)): »to be sure, grounded theory is an inductive methodology, but there is some deduction in grounded theory«. Or in the words of Urquhart (2019): often, the phenomenon itself will demand a combination of quantitative and qualitative research. In total three versions of deduction could be identified: logico-deduction, syllogistic logic, and deduction as the Chicago School of Sociology understood it (Gilgun, 2019).

Thornberg & Dunne (2019) considers GTM as an interplay between induction and abduction/retroduction. Abduction, in this sense, is an intellectual jump that adds something very new to the concept or theory (Reichertz, 2010). Gilgun (2019) argues, that retroduction is a kind of inference in which a new category 'emerges' through a creative combination of empirical data with previous theoretical knowledge leading to new categories.

The generalization from data (e.g. a single case or a category of cases) follows »what« questions: What is my case of? What is theoretically important about my case? (Hood, 2010). The design and development of theory by the use of GTM pursues the »why« question by focusing on the phenomena through a rigorous concept-centric approach (Wolfswinkel et al., 2013). In doing so, the selected literature proposes methods, such as constant comparison and theoretical sensitivity.

Constant comparison is the heart of coding, as, for example, Belgrave & Seide (2019), (Dey, 2010) argue, and captures a set of strategies (Charmaz, 2008), such as the concept-indicator model. Within this model, incidents are compared to other incidents, emerging concepts are compared to more incidents, etc. to generate theoretical properties (Hood, 2010) until a core category emerges (Holton, 2010). Constant comparison is used to analyze data from different perspectives (Birks et al., 2013) with the objective to produce evidence and to refine theory (Dey, 2010). It supports the researcher to integrate literature with the codes, concepts, and categories (Thornberg & Dunne, 2019) and to develop theory more systematically (Belgrave & Seide, 2019). But also, the application of constant comparison highlights sets of subcategories of a given category and relations to other categories (Kelle, 2010). Constant comparison requires theoretical sensitivity – »an ability to have theoretical insights into [one's] area of research, combined with an ability to make something of [one's] insights« (Kelle (2010) quotes Glaser & Strauss (1965)) to generate concepts from data, including analytic temperament and competence (Holton, 2010). Theoretical sensitivity is an individual quality of a researcher (Kelle, 2010).

As identified, in GTM there is an ongoing discussion about the development of formal theory or substantive theory. In the course of substantive theory, the researcher presents a theory that addresses a specific context (Dey, 2010) (i.e., people) with an ongoing concern or problem. Its test is how it works in the field, addressing the problem on which it theorizes. Literature should be integrated in the theorizing process. Substantive theory can be the final result of a study but also the starting point for formal theory (Lempert, 2010). Formal theory builds upon substantive theory and is based on the general implications of the core concept of a substantive theory (Glaser, 2010). It is an extension of a substantive theory's core concept (Glaser, 2010), but is not specific to a group or place. Instead, as Lempert (2010) highlights, formal theory applies to a wide

range of concerns and problems across situational contexts. The substantive theory and the formal theory are middle-range theories (Kearney (2010) cites Glaser & Strauss (1967)): they have limited scope and refer to certain societies, cultures, or specific social groups. Grand theories, in turn, relate to all social phenomena regardless of time and space and make universal claims (Kelle, 2019).

A finished GT fulfills the following criteria: »a close fit with the data, usefulness, density, durability, modifiability, and explanatory power« (Charmaz (2008) cites Glaser & Strauss (1967) and Glaser (1978, 1992)). A grand theory is presented by significant concepts and then, through the articulation of theoretical propositions (the relationships between the categories) (Holton, 2010), hypothesized relationships (Kearney, 2010), and/or hypothesis (by the connection of the categories) (Kelle, 2019).

4 Concluding remarks & characteristics of a GT researcher

The paper at hand presents a literature review on the Grounded Theory Methodology (GTM). It shall support novice researchers and established researchers, especially within the field of Business Informatics and Information Systems (Engineering), in their empirical research. The paper builds upon Wolfswinkel et al. (2013) who developed a five-stage grounded-theory method. In doing so, this paper adds the philosophical, ontological, and epistemological dimensions of GTM to this five-stage process.

As explored, the Grounded Theory Methodology emerged in the 60thies of the past century. Since then, GTM has established several philosophical streams, such as objectivism (the Glaserian approach to GTM) and constructivism (the Strauss approach to GTM). Within selected literature, a turn to constructivism is observable (e.g. Charmaz, Clarke).

As the Literature Review turns out, to apply the GTM, researchers need certain characteristics. As explored in the literature (*and depicted in Tabel 2: category »Characteristics of a GT researcher«, based upon two concepts, 17 open codes, and 82 quotes*), the most-announced characteristic of a GT researcher is reflexivity (13 quotes), followed by creativity (10) and flexibility (6). A GTM researcher needs to be open-minded and able to deal with confusion (Holton, 2019) and chaos, needs to apply control (Holton, 2010), and work with (continuous) adaption mechanisms (Corley, 2015). Additionally, the GT researcher needs an analytic temperament to fracture and interrogate data (Holton, 2010) (e.g. digital and technological (Birks et al., 2013), tolerate regression and confusion, and be able to distinguish between fact and fiction (Dey, 2010) – from the beginning of the GT study until its final, as Corley (2015) highlights. To get to the final of a GT study, the research needs to pursue a clear goal: build theory vs. test theory vs. describe phenomena (Corley, 2015). The research question is about »how« (Hood, 2010).

It is important, as Stern (2010) highlights, that the GT study is situated within the body of related literature: it is academically honest and gives credit to other researchers. Literature is considered a source of theoretical sophistication and theoretical sensitivity; but it must not block the creativity and abstract discovery of a GT researcher. There is no need to review all the literature beforehand (Thornberg & Dunne, 2019). The idea behind delaying the literature review is to provide pure induction. If the literature review was done before, it should be both empowering and enriching (Thornberg & Dunne, 2019).

As Denzin (2010) argues, the writing of a GT study is direct, immediate, and subversive as well as captures no big words. The tense is present tense (Kearney, 2010) and needs to be written, as Stern (2010) highlights, so that it makes sense to the audience: the audience decides! This begins with a sound title. A GT study needs to demonstrate how it adds a new dimension and/or element that was unknown before. A working paper, as Martin (2019) highlights, can be a possibility to direct the research. It is a springboard for the presentation of smaller papers on the developing theory. The GT research can begin to work on and answer theoretical questions and alternatives (Martin, 2019).

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